DOCUMENT RESUME

ED 327 176 IR 014 802

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TITLE Using Technology To Support Professional Development for Teachers and Administrators: Implications for State-Level Policy and Planning.
INSTITUTION North Central Regional Educational Lab., Elmhurst, IL.
PUB DATE 90
NOTE 43p.; Paper commissioned for the Chief State Officer's State Technology Conference (Minneapolis, MN, April 29-May 2, 1990).
PUB TYPE Viewpoints (120) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Administrators; *Educational Change; *Educational Technology; Elementary Secondary Education; Inservice Teacher Education; *Instructional Improvement; Postsecondary Education; Preservice Teacher Education; *Professional Development; Statewide Planning

ABSTRACT

There is a need for professional development to enable current and prospective teachers and administrators to enact major educational changes in the organization and operation of elementary and secondary schools. Such changes include redefining the role and responsibilities of schools; understanding the increasingly diverse student population; redefining curricular goals, content, organization, and strategies for instruction; and restructuring the organizational context of schooling. In preparation for these changes teachers must expand their knowledge base, learn "real world" applications for educational technology, and develop new attitudes and beliefs about the teaching and learning process. Access to professional development opportunities must be flexible to encourage teachers to participate in their own growth and self-renewal and to collaborate with other professionals. Preservice and administration preparation should be altered to fit the changing educational environment as well. Technology can be used to extend and make more effective much of the professional development that is currently available in schools, school districts and states. Statewide planning such as development of technology infrastructures and investment funds, reviewing existing certification standards and the effectiveness of professional development opportunities, and developing strategies to use technologies in professional development, are but a few ways that states can become involved in the process of improving instruction. (19 references) (DB)

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USING TECHNOLOGY TO SUPPORT PROFESSIONAL DEVELOPMENT FOR TEACHERS AND ADMINISTRATORS:
Implications for State-Level Policy and Planning

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Paper commissioned for the Chief State School Officers' 1990 State Technology Conference, Minneapolis, MN, April 29-May 2, 1990.

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USING TECHNOLOGY TO SUPPORT PROFESSIONAL DEVELOPMENT FOR TEACHERS AND ADMINISTRATORS:
Implications for State-Level Policy and Planning

Overview

Throughout the nation, educators, policymakers, legislators and the general public are increasingly interested in the potential of modern technology to transform education – both in terms of what is taught, how it is taught, and how the educational enterprise is managed. More and more schools are seeking new computer hardware and software as a vehicle for addressing poor academic performance, providing enrichment options for students already performing well by traditional standards, and, improving their ability to collect and analyze data to support management and planning. Similarly, through new curriculum standards, policymakers and legislators are encouraging or even requiring that computer literacy, keyboard skills, and, to a lesser degree, programming, be included as part of the "new basic skills".

In addition, as state departments of education have increased requirements for high school graduation, an increasing number of schools are exploring distance learning technologies as a means to fulfill these new standards. The broader community, including business, has also has played an active role in focusing attention on technology by reminding educators that in order for our nation to remain competitive in the increasingly technological and global economy, the workforce

must be a technologically literate one. Tomorrow's adults must function effectively in a world that will increasingly use technology to create, process and manipulate information; to develop innovative products and services, and to increase the productivity of a shrinking workforce.

Additional evidence for this growing interest in technology as a means to reform or restructure education comes from a myriad of sources. For example:

* in recent years the number of journals and other periodicals as well as professional organizations devoted to educational technology has increased exponentially;

* in the 1989-90 school year there will be no less than 16 national conferences on educational technology (Education Week);

* in a recent survey of State Departments of Education by Electronic Learning magazine (October 1989), 77 percent reported increasing use of educational technology as a continuing priority;

* 23 states and the District of Columbia require all, or at least some students to take computer courses in order to be certified;

* led by California, Florida, and Texas, more and more states are developing partnerships with technology companies, as are increasing numbers of schools and local districts (Electronic Learning, April 1990);

* there are few educational publications that do not contain information on new hardware and software; and,

* educational research has increasingly focused on the use and impact of technology in all areas of the educational enterprise.

However, in virtually all cases, references to educational technology are decidedly skewed toward technologies used for instruction, and primarily by students, with the next highest category being administrative applications.

While these instructional and administrative applications are important elements in the equation for educational improvement, we believe that they tend overlook the potential power of today's technologies to provide expanded, innovative and improved options to meet the professional development needs of both preservice and inservice teachers and administrators. Currently however, most references to professional development and technology refer almost exclusively to training teachers how to "use" computers, or to providing general computer literacy. We believe that this perspective on the role of technology for professional development is unnecessarily narrow, and tends to minimize the important contributions that technology-supported professional development can play in improving, and subsequently, restructuring schools.

This is particularly unfortunate in light of the rapidly increasing need for professional development to enable both current and prospective teachers and administrators to transform proposals for major changes in the organization and operation of elementary and secondary schools into meaningful realities.

Clearly, teachers must become familiar with instructional applications of technology, if it is to be effectively used to improve student performance. However, there are other important areas in which teachers and administrators will need to learn new skills, develop increased familiarity, and understanding, of the results of research and practice, and explore the implications of proposed changes for redefining their roles and responsibilities both in the classroom, and as members of the school community.

Further, while professional development is becoming increasingly important for all schools; the need is especially acute in geographically isolated districts that do not have easy access to professional development opportunities, and urban districts that serve large numbers of students who are increasingly "at risk" of either not completing, or adequately benefitting from their elementary and secondary school experiences.

However, while there is growing awareness of the importance of professional development as the primary vehicle for changing education, similar attention has not been paid to exploration of new strategies for its delivery. We believe that various technologies can, in many cases, provide more effective vehicles for professional development than the currently typical practices of one-time workshops or institute days, or even longer summer institutes or other courses.

Technology however, no matter how exotic or innovative, is primarily a tool for accomplishing new goals for professional development. Utilizing technology to more effectively or efficiently accomplish goals and priorities that are no longer appropriate, will not result in meaningful improvement in student outcomes. Accordingly, it is important that we first examine the new forces that are influencing change in our schools, the implications for professional development, and the manner in which technology can be used to support its delivery and effectiveness.

Frameworks for School Change and Professional Development

For the purposes of this paper, this framework is organized around the notion that the process of education is, at its root, a process of teaching. Whether that teaching is the dispensing of basic factual information to be simply remembered; guiding the development of utilitarian skills; promoting the capacity to learn independently; assisting in the acquisition of higher order skills, such as problem-solving, application of current knowledge to new situations, or development of new knowledge or insights; or, understanding one's relationship to a diverse society and world -- it is still "teaching" of one sort or another. The whole of our educational enterprise therefore, is, or should be, one which focuses on issues related to the teaching process in all of its shapes and forms; and, by implication and necessity, on the reciprocal process of learning by both teachers and students.

The framework includes five strategic issues derived from this metaphor:

1) **Why we teach -- redefining the role and responsibilities of schools**

As American society has changed, so too have the needs of children, and the resources and institutions available to meet them. Schools, currently, are the only societal institution dedicated to serving the needs of children -- the only place where the vast majority of children can be expected to come for an extended period of time.

As such, the schools are increasingly being proposed as the logical institutions around which to organize, focus and coordinate the wide variety of educational and related support services for both children and their families. Many schools are already moving in this direction through such initiatives as "Cities in Schools" programs, which provide on-site connections to various social service agencies, or "Lighted Schoolhouse," or similar evening programs that provide access to extended learning opportunities for the community's adults, as well as it's children.

The need for a reexamination of the roles and responsibilities of schools is also a response to the growing realization that allowing almost a third of our future adults to either drop out -- or complete high school with few, if any, useful skills -- is no longer tolerable. This new sense of urgency suggests that the role of

schools must evolve from being simply centers of opportunity, to centers of obligation. The approach of providing only access to equal educational opportunities, must be replaced with a commitment to maximizing equality of educational outcomes. Indeed, many educators and policymakers are proposing that meeting the needs of the increasing numbers of "at risk" students must become the new standard of success for the nation's public schools – those students for whom public schools represent both their first and last alternative.

Teachers who will work in such schools will have to be prepared to be more than dispensers of information to a fixed number of students. Instead, they will need to function as members of a broad-based team of professionals concerned with the overall welfare of the children, families and other adults in the school community. They will need broader understandings of the non-school factors that influence student learning; as well as, different perspectives on their responsibility for addressing those factors as an integral part; as opposed to an interruption or interference; of the educational process.

This does not mean that all teachers will need to become social workers, psychologists, or specialists in adult or family education. Instead, the implication is that they will need to have sufficient understanding of those arenas to be effective as participants in the expanded role that schools of the future will play

in their communities; and, as colleagues and collaborators with the non-teaching professional staff who will increasingly come to work in, and with, schools.

2) **Who we teach – understanding the schools' new clients**

The clients of America's schools (both students and their families), particularly those in urban areas, has permanently, and significantly changed. As Harold Hodgkinson has noted, the demographic and socioeconomic trends are clear. The student population is becoming increasingly diverse -- more students will be from various minority groups; more students will come from families where English is not the first, or primary, language; more students will have parents with less than a high school education; and tragically, more students will live in poverty, or even on the streets. These new demographics however, are not, as some would like to believe, simply a temporary aberration -- there is no other pool of "better" students waiting in the wings -- who we have, is who there is.

Though the predominant discussion in this regard tends to focus on the increasing number of minority student in American schools, the true diversity is reflected in students who bring to school more than differences in skin color, physical appearance or language. Today's students also bring to school different histories, cultural perspectives on the world in general and schooling in particular, different patterns of experience and expectations, and, diverse styles and approaches to learning and organizing information. Teachers and

administrators who find themselves faced with this increasingly diverse student population are also frequently confronted with new (and for most, unfamiliar and confusing) "belief systems" that govern student's motivation, interaction with teachers and other students, and ability to successfully adapt to educational structures that were not designed, and teacher who were not trained, to meet their unique, different, but no less legitimate needs.

Future educators must not only be aware of this "new" diversity, but must be attitudinally, and practically, prepared to be comfortable and confident in accepting it as an expected part of the context in which they will work.

We can no longer afford to have teachers or administrators who have little understanding or respect for the students they teach, or who explain away poor student performance by simply condemning or lamenting the characteristics and / or circumstances of those students who come to school not prepared to adapt to whatever the teachers and school happen to be prepared to offer. Nor can we continue to accept the less offensive, but equally ineffective, "missionary" approach, where more time is spent describing, and being "appropriately" sympathetic, to the conditions of their students lives; than to ensuring that students have the skills to change them.

All educators will need to develop new attitudinal infrastructures regarding their responsibility to find a way to connect with "whoever shows up Monday." Their sense of efficacy must be tied to a belief system founded not only on the reality that **all** students can learn, but that the differentiating factor is the appropriateness and effectiveness of the instructional experiences to which they are exposed, rather than the characteristics of the families and communities from which they come, or the "learning credentials," they bring to the classroom. As Ron Edmonds noted, "we can successfully educate all students whose schooling is of importance to us."

Most teachers and administraotrs however, were not prepared for the challenges and realities of today's calssrooms and schools. Helping them develop the understandings and skills; as well as a new sense of confidence and efficacy can most easily and reasonably be developed through professional development experiences at both the preservice and inservice levels.

3) **What we teach – redefining curricular goals, content, organization, and strategies for assessing student progress**

As noted earlier, a fundamental issue in restructuring American elementary and secondary education, is the matter of the goals we are seeking to achieve, not simply the manner in which they are pursued. It is truly a matter of desired outcomes over preferred processes.

In general, we believe that there are three central organizing constructs in this arena: a "new definition of learning;" the "thinking curriculum;" and multidimensional strategies for assessment.

The first point of departure is to consider a "new definition of learning." As opposed to the typical definition of learning as student proficiency in simply repeating isolated facts that have been more often memorized than understood; the new definition of learning reflects an increasing consensus that an information-dominated society will require adults able to cope with a continuous onslaught of ideas, symbols and images; and who are capable of understanding, manipulating, constructing and applying information and knowledge to solve novel and complex problems. Tomorrow's adults must be prepared for a lifetime of inquiry, analysis, collaborative learning and problem-solving, decision-making in a context of uncertainty, innovation and change. These abilities represent the "new basic skills" of the future, and the "new definition of learning" that must drive new models of schooling.

Secondly, we must explore the content and structure of the curriculum. The concept of the "thinking curriculum," means that, if students are to engage in meaningful learning, a dual agenda of teaching both content and applied thinking skills must be implemented. It is no longer acceptable for students to

simply master isolated skills or facts as ends in and of themselves. If schools are to become "learning communities," the collaborative, interpersonal, and, intellectual skills needed to support it must become part of the curriculum. Skills to monitor and assess their own learning and motivation, must become part of the instructional agenda for students of all ages and abilities, but especially younger students, and students at risk. Finally, higher-order thinking and reasoning must pervade the entire elementary and secondary curriculum.

In support of this new concept of curricular organization, many of the content area professional organizations are, or have, developed new guidelines for curriculum development. These new priorities for teaching science, mathematics and reading are primary examples of this new approach that focuses on the curriculum as a vehicle for promoting understanding, manipulation, and application of knowledge, rather than simply increased catalogues of factual information that students are expected to memorize and store for future recall.

"What we teach" must also be guided by an increased awareness of the importance of ensuring that the history, culture and patterns of experience, and, contributions of the diverse groups that comprise American society are both reflected and respected in the content of all courses, at all levels.

Lastly, curricula must be organized in an increasingly interdisciplinary manner to allow students to understand and explore the interrelationships between different content areas that have, more often than not, been separated for convenience, and in deference to the drive for professional specialization; rather than as a reflection of a lack of connectedness between them.

The third concept driving this new approach to what we teach is that of multidimensional assessment of student performance and progress.

If the curriculum is to change, the current debate over the validity and utility of standardized tests is likely to be intensified. It makes little sense to redesign curricula to teach for conceptual understanding and reflection, when the main assessment instruments measure primarily the accumulation of isolated facts, and performance of lower order intellectual skills. Alternative assessment methods must be developed to evaluate, and promote, the capacity of learners to engage in higher-order thinking, to be aware of the learning strategies they use, and to recognize and employ multiple aspects of intelligence, such as creative, artistic, or interpersonal expression. Thus alternative modes of assessment are both valuable to students in promoting their individual development, and to teachers in increasing the effectiveness of their instruction.

In addition, this new view suggest that multiple choice, norm-referenced, standardized tests should no longer be used as the primary vehicle for assessing the progress of individual students, or the effectiveness of teachers and schools. While they will likely remain part of the mix for the foreseeable future, other measures are increasingly being included in the overall assessment process. Further, the movement toward new assessment strategies, including those that involve the students themselves, will have the important advantage of being integrated into the instructional process to provide ongoing feedback on what is occurring, and how it might be improved. This is in stark contrast to the current approach of measuring what has, or has not been accomplished at a point in time when it is usually too late to do anything about it.

4) **How we teach – new goals, models and strategies for instruction**

If there are profound changes implied from the new definition of learning and the thinking curriculum for what students learn, there are equally significant implications for the role of teachers in the classroom. Teachers would engage in such roles as facilitating, mediating, modelling, guiding, assisting, sharing, listening, and adjusting. Teachers in the "collaborative classroom" will help students set their own learning goals, and assess what they have learned. Moreover, teachers may well be teaching persons of all ages, both inside school and out; as well as increasingly diverse groups of students within heterogeneous classrooms.

This new approach to instruction will also require that teachers learn how to assess, and build on the personal, cultural and social strengths student bring to the classroom, and assist students in learning how to build on those foundations to develop new skills and competencies.

This vision of teaching however, goes beyond current approaches to cooperative learning, in which the teacher sets tasks for individuals who work in groups. Indeed, the teacher in these classrooms works strategically to give students a voice in setting their own learning goals and assessing what they have learned, providing information and support where it is needed, and helping students build connections between home, culture, and schooling. In this conceptualization, student are active participants in the learning process, not passive recipients of it.

Truly collaborative classrooms will require teachers who have a comprehensive understanding of group dynamics and process, and excellent interpersonal as well as, pedagogical skills and content knowledge. They must be able to manage and monitor multiple tasks and activities simultaneously, and make ongoing judgements about the type of instruction that makes the most sense for what is happening in the classroom at any particular moment. As such, teachers must learn to function as "situational decision makers," rather than as actors reading

the curricular script, or football players running whatever play was called from the bench (or, if you will, the central office).

How we teach in the future will also involve new instructional arrangements than are currently typical. Increasingly, the organization of schools will no longer reflect the current pattern of one teacher having essentially total responsibility for the education of approximately 28 students (or five classes in high schools). Collaborative teaching, multiple strategies for grouping students for different types of instruction will become the rule rather than the exception in tomorrow s classrooms. Partnerships with others outside of the school will also become a regular part of the instructional process, with teachers serving as coordinators of learning experiences, as well as deliverers of instruction and information.

Teachers therefore, must be prepared to assume these new roles and responsibilities in the classroom, and in the school as a whole. They must have the appropriate skills to work collaboratively with other teachers; to understand, appreciate, and respect student diversity as a resource, rather than an obstacle; and, to use a wide array of teaching strategies as an integral part of their instructional repertoire.

5) **Where we teach – restructuring the organizational context of schooling**

The last major strategic priority that is driving the school restructuring movement involves the nature of the school as a workplace. If schools are going to effectively serve new functions and roles in their communities, address the needs of a dramatically changed clientele, and adopt new learning goals and instructional strategies; they must be organized and managed differently.

The evidence is clear and compelling -- schools as they are currently structured are not organized to fulfill these new goals. We must rethink the norms, priorities, organizational structures, and the rationale for them, that describe today's schools. New organizational models for schools must be developed -- models that provide a new vision of how schools could be organized and managed; the beliefs and norms that define their institutional culture; and the nature of the relationships between the people who work there, and people, organizations, and agencies in the broader school community.

In terms of school management, teachers will play a larger role in making decisions about school governance and operations than has typically been the case. The current trends toward school-based management, local school improvement teams, teacher-designed curriculum, and teacher participation on local school councils with members of the broader community are likely to accelerate.

Teachers in these increasingly locally managed schools must be able to function effectively as members of school-based teams, to make judgements about allocation of staff, fiscal and material resources, uses of time and space, student assignments, curriculum and instructional materials, and in some cases, the hiring and firing of other teachers and staff. Teachers will be expected to extend their involvement in planning far beyond individual lesson plans for their classes or subject area, to the development of long-range plans for the school as a whole.

If these changes are to be effective, administrators must also adopt new strategies and perspectives on their roles and responsibilities, as well as their relationship to other school staff. They must increasingly become facilitators and enablers, as well as managers.

In addition to these organizational management type activities, such schools will also function as learning communities for the adults, as well as the students. This means that teachers and administrators collaborate with each other to learn; that parents come into the school to learn; and that members of the community share their expertise in the school. Teachers and students will both teach and learn outside of the school, become involved in a variety of community service activities, and, connect with community agencies and organizations that can augment and support learning of both teachers and students. The community

can also provide a rich context for applying learning to complex, real-world problems, and for broadening learners' perspectives on their learning.

These areas then, though certainly not exhaustive, form a strategic framework for thinking about the priorities of the school restructuring movement in America's elementary and secondary schools.

Clearly these new directions for schools and schooling will require teachers and administrators who have been trained differently than their predecessors -- who will have knowledge, skills and experiences that go beyond those required to function in isolated, autonomous classrooms with essentially homogeneous groups of students, and covering standardized curricula -- all organized around instructional goals that are no longer fully sufficient to meet society's needs; and, management strategies that inhibit, rather than promote, change, innovation and shared responsibility.

New Directions for Professional Development

Clearly the myriad of new directions and priorities for schooling as outlined above will require major expansions of the professional development resources, opportunities and options available to both current and prospective teachers and administrators. While discussion the full range of these professional development needs far exceed the scope and space limitations of this paper, we believe that they can be grouped into seven major categories:

Expanding the Knowledge Base: Responding to this complex of new realities will require that teachers and administrators develop new understandings of the changing goals and expectations for education, the increasingly diverse students they will teach, what they will be expected to teach them, how it can most effectively be done, and the context within which the educational process will occur. In most cases these new understandings are far different than those they were taught as teacher education students, what they have learned from their on-the-job experiences, and the results of research previously conducted.

Today's, and tomorrow's teachers, must have ready and effective access to the tremendous pool of knowledge, research, and experience that provides the foundation for the new models of schooling being proposed and experimented with around the country. In far too many instances, educational improvement is not impeded by a lack of information, but the lack of access to it.

Learning from Practice: Access to information is clearly a necessary ingredient for educational improvement, but by itself, it is not sufficient. This is particularly true when one is seeking to help people develop new skills and patterns of practice that are different from, or even contradictory to those they have established over many years, and that have been previously considered fully acceptable. Teachers and administrators must not only become knowledgeable about new concepts, ideas and

models, but must have opportunities to learn how they can be applied in "real world," as opposed to, ideal or special situations.

Developing New Attitudes and Beliefs: Much of current educational practice is based on beliefs about students' capabilities and development, proper student and teacher roles and responsibilities in the instructional process, how learning occurs and can best be facilitated, and the responsibilities of schools as contrasted to those of the home and community. Changing attitudes and beliefs are among the most difficult aspects of any professional, or for that matter personal, development experience. Most often these can be changed by opportunities to engage in continuing dialog with others who share similar realities, responsibilities, and challenges/problems, but who approach them from different perspectives and points of view; and, who are willing to share their successes, failures and strategies for maximizing the former, and minimizing the latter.

Flexibility of Access: It is axiomatic that no matter how excellent a professional development opportunity might be, it is of little value if it is not accessible to either those who need it most, when they need it most; or to such small numbers of people that its impact is minimal or irrelevant. The majority of current approaches to professional development more often than not, suffer from one or more of these limitations. Issues of geography, scheduling, numbers of staff to be served, availability of substitutes, and the long-term availability of "expert" researchers or

practitioners; are just some of the impediments to easy and flexible access to professional development opportunities for most teachers and administrators. While there are examples of summer institutes, long-term professional development partnerships with colleges, universities and intermediate or private agencies, courses held at school sites etc., these options tend to be significant exceptions rather than typical examples of what is generally available.

Opportunities for Self-Renewal: As is true for virtually all other segments of society, the content and context of schooling is changing rapidly, and at an ever accelerating rate. Accordingly, professional development is less and less an objective to be achieved, but instead, a continuing journey -- one that must be undertaken in part, by each individual operating within the contexts of their own unique needs and circumstances. Like students, educators too must become lifelong learners who are both disposed, and able, to pursue continuing growth in their knowledge, understanding and skill in the increasingly complex and changing environment of today's schools and society.

Collaborating with, and Contributing to the Growth of Others: We believe that, similar to other professions, the continuing growth and professional development of educators will be substantially enhanced by opportunities to collaborate with others who share their realities, but experience them in varying contexts and circumstances; and also by opportunities to share their own experiences, expertise, strategies and

innovations with, and for the benefit of others. The opportunity to take advantage of the expertise of others, as well as to be recognized for their own, can provide important reinforcement and incentive for continuing growth and development, as well as the enhanced personal status and respect that comes from membership in a "community of learners" with their professional colleagues.

Rethinking Preservice and Administrative Preparation

The previous discussion has focused primarily on professional development for current teachers and administrators. However, if tomorrow's schools are going to be substantially different than the ones we currently have, it is equally important that the nature of the preparation of future teachers and administrators be altered. In fact, many have suggested that, with the large number of teachers and administrators likely to retire within the next ten years, changing the preparation of incoming teachers and administrators may well have a greater and more long-lasting impact on substantially altering the character of schooling that inservice programs for current staff. It is, after all, the content, structure and experiences of these programs that help form teachers' and administrators' expectations, perspectives and attitudes about their future roles and responsibilities; as well as about the students they will teach, and the types of environments in which they will work. Equally important, these preparation programs also provide the knowledge, experiences and skills that provide the foundation upon which subsequent expertise can be developed. Improving the quality and content of preservice and

administrator preparation programs will not only result in educators better able to respond to the challenge of restructuring schools to meet the needs of all students, but also, educators that are more fully disposed to do so.

The next section of this paper explores how technology can be used to enable and advance these major professional development priorities.

Technology as a Vehicle for Professional Development

As we mentioned previously, with regard to professional development, technology is primarily a tool which can allow us to pursue desired professional development goals in a more effective, efficient, flexible and innovative manner than would otherwise be possible. This section explores some of these possibilities.

In each case, we have discussed the types of expanded options that can be made available through use of existing technologies, or those that appear to be worth experiment or investigation. This is therefore not, nor is it intended to be an exhaustive examination of what may be possible. Neither do we intend to imply that technology can, or should, totally replace more traditional forms of professional development. Instead, we simply propose that we exploit the options afforded by technology to extend and make more effective much of the excellent professional development that is practiced in many schools, school districts and states.

Expanding the Knowledge Base: Different people learn best at different times, under different circumstances, and through varying modalities. People also come to any learning experience with different quantities and qualities of prior knowledge. Use of technology can allow us to address all of these issues in a manner not easily duplicated by "live" workshops, demonstrations or lectures, no matter how well organized and conducted. For example:

* video technology can allow us to take advantage of the tremendous power of combining images with text and audio to maximize learning

* use of video tapes can ensure that large numbers of people, or small numbers of widely dispersed people can receive the same information, and maximize the likelihood that they develop the same understandings

* video tapes also allow segmenting large quantities of information, or unusually complex information into more manageable segments that can be used separately or as a series according to the knowledge level and time schedules of the target audience, including the options for home viewing at times when school is not in session, or when it may not be possible to convene a large group

* similarly, use of teleconferencing, cable and radio provide opportunities to reach large, diverse or scattered audiences efficiently, and in a cost-effective manner; or can provide college courses to audiences who may not be otherwise able to access or afford them

* audio tapes provide additional flexibility in providing well scripted information to both those who learn effectively by listening, as well as those who spend a great deal of time in their cars, or who could not attend a particular workshop. In addition, following the example of the corporate sector, complete instructional programs/courses, books and periodicals can be effectively made available through audio programs

* unlike reliance on workshops or expert presentations, use of video and audio tapes provide opportunities for unlimited review of information presented, as well as access for new staff and parents

* new interactive technologies (e.g. hypermedia, and video-disk) also provide extremely effective self-paced learning environments

* computer and phone conferencing can also provide opportunities for schools staff to question and dialog with experts who may be otherwise unavailable, and therefore have opportunities to clarify their understanding of information that may have been presented through any of the vehicles outlined above. In fact, new phone technologies that allow for simultaneous transmission of voice and data communications, offer even more exciting conferencing possibilities, by allowing participants to share information visually by either computer or fax while it is being discussed.

Learning from Practice: As we mentioned earlier, people develop new competencies best when they both have knowledge and examples that demonstrate how that knowledge is applied in practice. Again, videotapes and teleconferencing technologies, and to an increasing degree videodiscs, provide unparalleled options for teachers and administrators to visit classrooms and schools across the district, or across the nation to examine in depth, or in brief how others apply new concepts under conditions similar to their own. Simultaneous or delayed computer or phone conferencing can also augment these video demonstrations by providing viewers with the opportunity to interact with the teacher, principal or whoever was the subject of the demonstration, including students and parents.

Videotape also provides the option of developing low costs libraries of exemplary instructional practices which can be used by teachers either at home or at school, and can be replayed as many times as desired. Some teachers have even used videotapes

of classroom demonstrations of a new instructional practice to help students understand how their role in the process will change.

Developing New Attitudes and Beliefs: Beyond the awareness raising, knowledge transmission and examples that can be provided by video or audio tapes, or even interactive teleconferences, developing new attitudes generally requires sustained opportunities for dialog and debate with others. In this instance, computer networks, phone conferencing arrangements, and even voice mail technology provide effective extensions of face-to-face conversations, as well as the opportunity to express possibly unpopular (or socially unacceptable) ideas in a relatively anonymous or "safe" situation. Controversial ideas can be debated, challenged and argued without the personal animosity and residual anger that often accompanies such "confrontations" when held in person, or in a group.

Flexibility of Access: Because many of the technologies we have focused on here are recorded in one format or another, they are not time-bound, and can allow access in accordance with the schedules and preferences of individuals as opposed to groups. In addition, other options, e.g. teleconferences, or radio broadcasts, while time-bound, are not location specific, and have the options of repeated rebroadcasts at a wide variety of times. Access to basic informational or more directly instructional programs at home, in the classroom,teacher's lounge, office or car all provide increments of accessibility not typically available through traditional professional

development strategies. Alternately, interactive technology can provide access to large numbers of people simultaneously, even though they may participate in small groups in a variety of locations. This can be particularly important in large school districts that need to reach thousands of teachers and administrators. This flexibility will also be significantly enhanced and expanded by new broadcast satellites and receivers that can literally provide options for satellite reception at virtually any location for a little as $400, using dishes that can be mounted on a window sill.

In addition, flexibility also involves providing individuals to access just the information or programs that meet their interests or needs. As with students, maximizing individualization of learning opportunities is an important flexibility that should be similarly available to professional educators.

Opportunities for Self-Renewal: Technology provides diverse, flexible and relatively cost-effective means for providing information, examples and instruction related to new models and methods for managing and organizing schools or instruction. As such, they can be provided as periodicals to allow educators with continuing access to new information, ideas, and examples from practice. Further, the flexibility afforded by various technologies helps to maximize the opportunities, as well as the likelihood that individuals will take advantage of them during times when they are most amenable to learning, as opposed to being forced to "get ready to learn" at times that are most convenient to others.

In addition, effective self-renewal strategies should include the opportunity to examine one's own knowledge, understanding and practice under "safe" circumstances that are not complicated by concerns about evaluation by superiors, or unfavorable judgements by peers. New video tape technologies provide an inexpensive means for educators in all roles to record their behavior for later examination and evaluation, either by themselves or "trusted" colleagues.

College courses are also another vehicle for self-renewal that can be made more accessible through technology – whether it is a video or audio-based course with periodic in-class seminars, or one in which the instructor conducts office visits via computer or phone.

Finally, increasingly available and affordable multi-media technologies (e.g. Hypercard, Linkway, or interactive videodisc simulations) provide educators with options for designing their own learning programs, or to examine the implications or results of their judgements or approaches to a variety of school situations that could not be duplicated in real settings.

Collaborating with, and Contributing to the Growth of Others: We have mentioned several times in this narrative the various options for using technology to dialog electronically with colleagues across town or across countries. Such computer

and phone conferencing options, bulletin boards, and two-way interactive video technologies provide flexible, and increasingly cost-effective means for broad-based collaboration; as well as the opportunity to share ideas, instructional materials and strategies, to get feedback on problems, and to develop relationships with colleagues that may not be otherwise easily arranged -- particularly for teachers and administrators in geographically isolated schools.

Rethinking Preservice and Administrative Preparation

Clearly the uses of technology for professional development described above all have similar applications and benefits if used as delivery vehicles in preservice education programs. There are however, several areas in which we think technology can provide particularly important benefits for preparation of prospective teachers and administrators.

Beginning with teachers, most reports on preservice education have cited the lack of access to the most current research, insufficient and often, poor quality, clinical experiences, lack of opportunities to learn from expert practitioners, and lack of follow-up support as critical and pervasive shortcomings. In each case, technology can provide new options and alternatives that have not been well explored by preservice educators.

For example, technology can provide access not only to information about current research, but, through videotape and interactive videoconferences, examples of how such research can be applied in practice. Interactive technologies can also allow prospective teachers to ask questions of practitioners as they teach. Such dialog, either in real time, or through conferencing technologies can help preservice students understand not only what expert teachers do in the classroom, but why. Such access can also be extended to provide an alternative (though to be sure, not a fully satisfactory one) to on-site clinical experiences where constraints of time and distance minimize the opportunity for extensive visits to classrooms.

Opportunities for prospective teachers to videotape practice lessons for subsequent review by panels of expert teachers provides another option for establishing closer connections with current practitioners, and for obtaining a range of feedback and suggestions for improvement that they would unlikely have access to under typical circumstances.

Further, conferencing technologies, coupled with easily available videotaping technology can provide important opportunities for continuing support from preservice faculty, or indeed other content area specialists.

Going further, fax and electronic mail can allow new teachers access to immediate feedback on lesson plans, teacher-developed tests, or instructional strategies for

addressing particularly challenging classrooms situations from both their former professors, as well as their colleagues.

Preservice instruction can also be enhanced through the use of sophisticated simulation technologies that allow preservice students to explore possible consequences of classroom decisions, without the need to "experiment" on a cooperating teacher's students. Such simulations can be particularly useful in preparing teachers for school environments and students with which they have no familiarity or experience. Similarly, hypertext technologies and interactive data-base software can assist preservice students in exploring options in curriculum design or instructional planning, and in evaluating the implications of their daily or weekly lesson plans for what students will be expected to do.

For prospective administrators, technology can similarly provide opportunities for communications with practicing administrators to dialog about strategies for management, leadership with staff, working with diverse parents and communities, handling discipline appropriately, addressing racism and discrimination etc. Such easily accessible conferencing options can also provide the opportunity to query administrators in a variety of settings to get their perspectives on how administrative issues might be handled under different situations and circumstances.

Simulations, as described above, can be equally powerful learning tools for administrators, particularly as they grapple with complex planning issues, and seek to develop strategies for mediating between competing priorities.

Combinations of various distance learning technologies can also provide effective vehicles for providing preservice and administrative education courses to those for whom distance, time and costs make enrollment in a "traditional" program all but impossible. This can be particularly important in providing access to non-traditional pools of potential teachers, especially minorities and those interested in pursuing alternative certification options now available in many states.

Lastly, as educators become more aware and concerned about the need for teachers and administrators adequately prepared to work in urban schools, or with at risk students, technology can provide access to faculty across the country who have special expertise and experience that may not be available on the students home campus.

Technology as Content for Professional Development

The primary focus of this paper has been uses of technology as a vehicle for professional development. We believe however, that technology as a content area is also important, and we would be remiss if it were not addressed in this discussion.

We have noted earlier, that most discussions about professional development and technology focused on either, helping teachers to understand and manage instructional technology that will be used primarily by students; or, assisting administrators in learning how technology can improve current approaches to data collection and analysis. We believe that these priorities, while important, overlook another important aspect of technology as a content area for professional development.

In the classroom, for example, we believe that it is important that technology be viewed as much as an instructional and management tool for teachers, as it is a learning vehicle for students. Technology can help teachers both improve their current instruction, as well as expand their instructional repertoire far beyond what is currently possible in most classrooms. In addition, technology can help teachers effectively monitor student progress, plan necessary interventions, or alter instructional strategies and/or priorities. This is particularly important as instruction becomes more individualized, multidimensional approaches to assessment more common, sources of instructional resources more numerous, and students more diverse along any of a number of dimensions.

At the administrative level, technology can surely assist in more effectively tracking standardized measures of school effectiveness and student performance; e.g. tests scores, special services placements, attendance rates, credits accumulated, etc.

Similarly, technology can assist administrators to more effectively and efficiently manage increasingly complex budgets, personnel records, or legal obligations (e.g. provision of bilingual or special education services). Technology can even help administrators save money by using computers to control heating and lighting systems, or manage supply acquisition.

However, technology can also be used to support decision-making by providing the opportunity to explore the impact of various alternatives in a wide variety of situations, such as: allocation of fiscal resources, new schedules, varying assignments of personnel, equipment purchase and utilization alternatives, etc. Technology can also provide new options for communicating with student's homes or other community agencies, or for making information readily available to school staff.

None of these new options will be effectively put into practice unless teachers and administrators are both made aware of, and trained to use technology to accomplish them (ignoring for the moment the issue of the initial costs in acquiring them). We believe that school improvement will be significantly enhanced if these areas become content priorities for professional development.

Implications for SEA Policy

Clearly, the implications and possible arenas for state involvement in any or all of these areas are too numerous to attempt to review for the purposes of this narrative.

We would propose however, the following as areas in which use of technology for professional development can be best advanced by state-level policy and programmatic initiatives.

1. **Development of statewide (and ultimately multi-state) technology infrastructures, or electronic highways**
   Currently, use of communications technologies is hampered by incompatible transmission systems, multiple phone companies, lack of common connectivity and data transmission standards, and the high costs and inefficiency of attempts for individual districts to address these issues individually. Such networks can also be integrated into statewide economic development initiatives, and can provide services for business and commercial interests, as well as schools.

   In addition, as professional development opportunities extend beyond the school day and the school facilities, issues such as access and line usage costs for teachers and administrators who utilize conferencing technologies will need to be addressed. Exploration of statewide educators "800" access lines may be an issue whose time has come.

2. **Develop capital investment funds to provide low cost access to hardware, software, and programming**
   The negotiating power of the state as a major purchaser, as well as the opportunity to finance large scale purchases by local districts against future revenues, or issuance of bonds needs to be explored. This is particularly important for those districts with relatively few discretionary resources, or who would require major capital investments to provide a critical mass of technology sufficient to make access meaningful and readily available to large numbers of staff.

3. **Develop new school construction and renovation standards that will allow subsequent installation of technology easy and cost-effective.**
   In most schools, including a significant of those newly constructed, access to technology is limited by the lack of appropriate wiring, phone lines, cable connections, internal distribution networks, or at minimum, cable channels that

subsequent installations without the inconvenience and expense of cutting through walls, ceilings and roofs.

4. **Review existing standards regarding the use of technology-delivered professional development for new or continuing certification.**
   In many states, professional development is limited to face-to-face contact, or to distance learning courses authorized for only a limited number of institutions. As telecommunications and related technologies become more available, accessible and common, states must address these issues, as well as those of cross-state certification of instructors, standards for content and acceptable levels of participation, and entirely new guidelines for professional development activities that are provided using computer and related conferencing technologies.

   In addition, program approval guidelines for preservice and administrative preparation programs should be examined to ensure that, at least, they do not act against incorporation of new technologies, and at best, encourage and support its use.

5. **Evaluation of the effectiveness of various technology-supported professional development opportunities -- particularly for new or continuing certification -- should be another arena for potential SEA involvement.**
   Thought the options possible using available technologies are well established, the relativeness effectiveness for varying purposes is still an unanswered question. Use of technologies in the ways suggested here are still largely experiments, and much data needs to be collected and carefully evaluated to provide guidance for future initiatives in this still infant area.

6. **Establish partnerships or consortia to support the develop of programming and software.**
   Though hardware has become relatively inexpensive, even for the most sophisticated interactive systems; initial program development, videotape production, and development of more elaborate interactive videodisc based simulations remain fairly high costs investments – particularly if undertaken by single schools or districts.

Since many of the issues, concerns and needs are similar across schools, districts and even states, this seems a logical arena for state leadership and fiscal support. In addition, this arena provides exciting opportunities for partnerships with the private sector, particularly those corporations that have been involved in utilizing technology for their own professional development and training for many years.

7. **Establish opportunities for pilot projects to explore the use of technology to provide professional development for persons seeking alternative certification, as well as for beginning teachers through induction and other first-year support programs.**
In a majority of states, general, or subject specific teacher shortages have led to the creation of various alternative certification strategies. In addition, increasing numbers of states are encouraging or requiring some form of support for beginning teachers.

   In both cases, technology can provide a variety of professional development opportunities that can help meet the expanded and variable professional needs of widely diverse audiences. How best to utilize technology to fulfill these roles, and how technology can best be integrated with current programs however, has not yet been established.

   Because of the SEA's overriding interests in, and, more often than not, responsibility for, both of these areas, SEA's seems the logical agency to take a leadership role in promoting and supporting such explorations.

8. **Develop strategies to use technologies to promote equity of access to high quality professional development opportunities.**
As in other areas of education, use of technology for professional development requires access to resources. The dilemma this poses is that those schools and students who already have access to the most resources, are also best able to take advantage of new technological capabilities; while those school and districts most in need of improvement, and with the fewest resources to support their efforts, seldom have access to technologies that could provide effective and exciting professional development opportunities for their staff. There is a clear and compelling danger that new technologies -- rather than reforming or improving education as a whole -- may simply exacerbate and expand the current inequities that exists.

We believe that the states have an primary responsibility for developing policies and strategies for ameliorating this potentially tragic situation. SEA's will need to consider the types of initiatives that will allow technology-supported professional development to be an equalizing force in the quest for educational improvement, rather than an divisive one.

9. **Utilize the State's professional development staff, or intermediate agency network, as models of the use of technology for professional development.**
   Increasingly, states are developing various professional development delivery system to support school improvement. Whether these systems are organized around individual consultants or SEA staff, or networks of intermediate agencies, they provide an excellent vehicle for demonstrating and supporting the use of technology for professional development in two particularly important arenas: (a) using technology to provide professional development related to implementation of state-wide improvement initiatives; and (b) providing a structure for professional development within which technology can be effectively used.

There are no doubt a myriad of other areas in which have implications for SEA involvement and policy development. We believe however, that these represent a starting point for those discussions. Toward that end, we hope that this narrative has been useful.

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